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ABSTRACT

This paper present a model of factors influencing the teaching-learning exchange in adult distance education, focusing on five factors that have primary influence on the teaching-learning exchange: the teacher, the student, the content, the environment, and the learning community. Several techniques are proposed to overcome the limitations of distance education, including a course Web site, a threaded discussion forum (HyperNews), Web-based dynamic feedback forms, visualization, and interactive lecture outlines. Examples are provided of how these techniques were applied in a graduate course for the management of research and development. Measurement of asynchronous adult student preferences regarding these techniques is presented. (Contains 18 references.) (MES)

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Preferences of Asynchronous Adult Distance Learners

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Abstract: The boom in distance education provides a unique opportunity to serve the growing adult education market, but current asynchronous distance education technologies constrain the teaching-learning exchange. A model of factors influencing the teaching-learning exchange is discussed. Several techniques have been proposed to overcome the limitations of distance education. An overview of some of these techniques is also offered. Finally, measurement of asynchronous adult student preferences regarding these techniques is presented.

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Introduction

The imperative for learning organizations and life-long learning in individuals has been recognized for the better part of the last decade [Senge 1990]. Perhaps this is one reason why adult education is the fastest growing segment of the education market [Department of Education 1994]. The merger of collaborative learning and computer mediated communication (CMC) technologies is critical to ensure future educational success [Ben-Jacob and Levin 1998]. Asynchronous learning is the most flexible form of distributed education; that makes it well suited to adult learners [Black 1998]. However, the trappings of distance education have negative effects on both the education environment and the educational community [Hsu and Sammons 1998].

Learning Factors

There are five factors that have primary influence on the teaching-learning exchange [Heimlich and Norland 1994]. These include the teacher, the student, the content, the environment and the learning community. The teacher has primary responsibility for directing the exchange. Individual students are the primary targets of the exchange. The content is the knowledge to be exchanged or expected learning outcomes. The environment includes the physical surroundings and teaching artifacts. The learning community is formed by characteristics and social patterns shared by the students and with the instructor.

Studies have shown that distance education forces teachers to become better prepared, better organized, and therefore more effective [Souder 1993]. The more time that is spent up front, the more confident the teacher will be and, ultimately, the more successful the exchange [Bergmann and Raleigh 1996]. Distance education students tend to be older, more motivated, more self-disciplined, are more likely to possess a college degree, have expectations for higher grades, and, therefore, appear to be more successful than their on-campus counterparts [Champagne 1998]. In asynchronous distance learning, students take more responsibility for their own learning, reflect more deeply on the course content, and benefit from being able to tackle ideas at their own pace [Black 1998]. Learning outcomes are typically similar for traditional and distance versions of the same course, though technological issues can have an impact on the artifacts associated with content delivery [Hsu and Sammons 1998]. The technology associated with distance learning can have both positive and negative impacts on the learning environment. The availability of instructional technology may provide new tools and opportunities for concept visualization [Porter 1997], but learning exchange participants may not be comfortable with issues such as speaking into a microphone, appearing on camera, using an electronic pen or utilizing an electronic group discussion forum [Hsu and Sammons 1998]. Technology has a significant impact on the learning community

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[Brown and Duguid 1993]. Both teachers and students depend on non-verbal cues to ascertain, for instance, the level of student attention or whether the instructor would welcome a question. A bound set of the instructor's notes conveys more accuracy and authority than the same set of notes downloaded from a web site [ibid.]. Several techniques and tools have been proposed to overcome the impact of distance education on the learning community. Experiences applying some of these techniques in a graduate course for the management of research and development (EMEN5300) follow.

EMEN5300 is delivered in three modalities: a small number of on-campus students participate live in the studio classroom, a small number of regional students experience synchronous delivery via one-way video, two-way audio Instructional Television Fixed Service (ITFS), while the majority of students participate asynchronously via VHS videotape. The total enrollment was 20 students. The course production values most closely resemble the "you get what you see" (YGWYS) model [Cyrs and Conway 1997]. Students admitted to the program are required to have obtained a minimum of a bachelor's degree in an engineering or physical science discipline, so a higher than average student facility with computers can be assumed. Approximately 10% of the enrollment is believed to include non-native English speakers.

Techniques and Technologies

Course web pages can help synchronize delivery of some material to asynchronous remote students. A good course web page should include information about the course, information about the instructor, methods to facilitate course communications, assignments, text book information, distributed materials and links to related materials [Ackermann 1996]. The EMEN5300 course web page at http://www.colorado.edu/EngMgmtProg/courses/EMEN5300/ includes these all of elements and more. Approximately 10 minutes were taken during the first course session to describe the course web site for the students.

Listserv is a common tool for CMC on the Internet [Kroll 1994]. Listserv also appears to be a CMC tool of choice at the University of Colorado. Unfortunately, listserv has several limitations, or at least unattractive trade-offs, for asynchronous learners. For international students, there is often a several week delay before they receive the first installment of course materials, including information about the course web site and the listserv. If the list is set up to reflect individual e-mail messages, then remote students tend to miss many of the early posts. If the list is setup to produce digests after a lengthy delay, then on-campus and regional students lose the sense of continuity between lecture delivery and subsequent discussion. In either individual message or digest mode, the asynchronous nature of student access to the course materials virtually assures that the sequence of message topics will be jumbled. HyperNews, a web-based, threaded discussion forum, was used in EMEN5300 in an attempt to address these shortcomings. HyperNews has the benefit of leaving all messages visible without cluttering the students' mailboxes. The hierarchical structure also allows students to view messages in context. Approximately 20 minutes were taken during the first course session to introduce HyperNews.

In a traditional classroom, the students provide dynamic feedback to the teacher through verbal and nonverbal cues [Hsu and Sammons 1998]. For many distance education situations, the feedback system is more like an autopsy where the instructor tries, after the course is over, to determine why assessment scores were lower than expected [Champagne 1998]. Frequent student surveys can help overcome the lack of immediate cues, but they must be convenient to encourage students' use and relatively inexpensive to encourage teachers and the administration [ibid.]. Web-based feedback forms were developed for each course session and linked to the course home page. As the semester progressed, some problems became apparent using specific browsers with the Common Gateway Interface (CGI) program developed for dynamic feedback. As a result, roughly one-third of the students were unable to use the dynamic feedback surveys. Approximately 5 minutes were taken during the first class session to illustrate the use of the dynamic feedback forms.

The instructor should help the students visualize course materials and should reinforce materials through analogy and metaphor [Gagne 1977 as cited in Markowitz 1990]. Clip art, "word pictures" [Cyrs and Conway 1997] and PowerPoint animations were used in EMEN5300 to help create visual analogies for course concepts.

Instructors must motivate students to attend to the course materials as they are being delivered. Students who receive handouts can focus more attention on the lecture and tend to do better on tests than those that do not receive handouts [Howe and Godfrey 1977]. However, students that receive a complete transcript or set of instructor's notes can become too passive and attention suffers [Kiwera 1987]. Instructors can strike a balance by providing lecture outlines instead of complete transcripts and by leaving key words blank for the student to fill in [ibid.]. "Interactive" lecture outlines with key word fill-ins were utilized in EMEN5300. Approximately 5 minutes were taken during the first course session to describe the interactive lecture outlines.

Preferences

For most of the techniques in the preceding discussion, students had three opportunities to express their preferences. An online survey was provided after the first course session that provided either nominal or interval response scales. This survey was part of the first dynamic feedback opportunity, so the CGI problem mentioned previously was in force. A mailed survey also featuring nominal and interval scales was administered when the course was about two-thirds complete. After course completion, students had the opportunity to evaluate the course, including the techniques previously discussed, via the university's Faculty Course Questionnaire (FCQ). The FCQ utilizes 5 point Likert response scales from zero (very poor) to 4 (very good). The FCQ also invites open-ended remarks under four headings: most effective aspects, least effective aspects, best ways to improve, and other comments. Participation in all three of the surveys was voluntary and responses were anonymous. Response rates were much higher for the FCQ than for the other two forms of survey; possibly because the FCQ is familiar to the students and is administered by the university instead of the instructor.

The university's information technology service group (ITS) made an unfortunate decision to upgrade the campus web server in the middle of the semester. Students experienced problems accessing the course web site for approximately 1 week and problems accessing HyperNews for approximately 2 weeks. It is believed that this introduced some negative bias towards web-enhanced instruction into the student preference responses.

Web Site

In the initial online survey, students were given the opportunity to rate the course web site as being "Clear & Useful", "Confusing & Useful" or "Useless". Eight students responded to the voluntary survey; 88% characterized the course web site as "Clear & Useful" and one indicated the site was "Confusing & Useful". The respondent that indicated that the site was confusing made the open-ended remark, "In the beginning, the web system structure is confusing but it is just matter of time and hands-on experience." The other open-ended remark related to the course web site on the initial survey was, "I find it beneficial to read/look over the view graphs prior to class. They also help me focus on the key points of the references." This was probably a reference to the fact that the other instructors' hardcopy slides are distributed with the videotapes, but the online slides helped this particular student with the reading assignments which are to be completed before the associated lecture. This unexpected, but beneficial result reinforces the notion that the goal of handouts is to focus students on the key lesson points [Cyrs and Conway 1997]

In the mailed survey, students could characterize the course web site as "More Convenient", "Equally Convenient" or "Less Convenient" than traditional distribution methods. Nine students responded with 67% opting for "More Convenient" and 22% choosing "Equally Convenient". Two respondents made open-ended remarks suggesting the addition of a key word search capability for the course web site.

In the FCQ, students were asked to rate the feature of downloading course materials from the web site. Seventeen students responded yielding an average score of 3.8 out of 4. One of the responses characterized the course web site as "Neutral" and none characterized this feature as either "Poor" or "Very Poor". The remainder classified the course web site as either "Good" or "Very Good". There were four open-ended comments which all indicated that the course web site was one of the most effective aspects of the course.

Taken together, these results seem to indicate a consistent, strong preference for the "Ackermann-style" web site. Since links to all of the remaining tools and techniques described herein were provided on the course web site, there may be some confounding of responses between this category and the others.

Threaded Discussion Forum (HyperNews)

In the initial survey, students were asked to rate HyperNews as being "Clear & Useful", "Confusing & Useful" or "Useless". Eight students responded; seven deemed HyperNews to be "Clear & Useful" and one indicated that it was "Confusing & Useful". There were no open-ended remarks about HyperNews from the initial survey.

In the mailed survey, students had the opportunity to indicate whether HyperNews "Improves Interaction", has "No Impact on Interaction" or "Degrades Interaction". Nine students responded to the question with 78% indicating that HyperNews "Improves Interaction". The remaining responses indicated that HyperNews had "No Impact on Interaction". The only open-ended remark about HyperNews was that the student wanted to "roll up HyperNews by discussion topic group". It is not clear what capability the student sought, but they may have been able to achieve the desired result using some combination of the HyperNews "Inline Depth" and "Outline Depth" features. In the future, more time will be spent discussing these features during the HyperNews training.

On the FCQ, the average rating for HyperNews was 3.2 out of 4. Two students out of 17 responding rated HyperNews as "Neutral" and one student rated it as "Very Poor" while the remaining responses were either "Good" or "Very Good". There were three open-ended comments about HyperNews from the FCQ that would be considered favorable. Two remarks indicated too much of a lag between assignment of the discussion question and full participation. These remarks reflect the broad geographic distribution of the videotapes and the instructor's reluctance to have strict deadlines on weekly discussion questions. While some students clearly needed this flexibility to accommodate work-related travel and family issues, other students clearly abused the system. Imposition of some sort of graduated discussion deadlines will be adopted in future course offerings.

Acceptance for HyperNews averaged approximately 80%, though the lowest rates were recorded with the second survey. This might be attributable to sampling variation. This "dip" may also have been caused by the extended down time experienced during the mid-semester server upgrade.

Dynamic Feedback

In the initial survey, students were asked to characterize dynamic feedback as having the potential to "Improve the Course", have "No Impact on the Course", or "Degrade the Course". All eight respondents indicated that dynamic feedback would improve the course. There were no open-ended responses related to dynamic feedback reported from the initial survey.

Students were offered the same range of responses with regard to dynamic feedback in the mailed survey. Six of 9 respondents indicated that dynamic feedback had improved the course and the remaining responses indicated that dynamic feedback had no impact on the course. The students offered no open-ended remarks regarding dynamic feedback with the mailed survey.

For the FCQ, the average rating for dynamic feedback was 2.8 out of 4. Nine of 15 responses rated dynamic feedback as either "Good" or "Very Good", 5 responses indicated that dynamic feedback had no impact and one respondent characterized dynamic feedback as "Poor". The students offered no open-ended remarks.

There was a downward trend in student opinions regarding the effectiveness of dynamic feedback. This may reflect that fact that the dynamic feedback CGI was incompatible with the browsers utilized by some of the students. It may also reflect a difference in students' perception of the its potential early in the course versus the perceived level of execution or follow-up as the course progressed. One factor that is thought to have impacted the effectiveness of the follow-up is related to dynamic survey design. The instructor made an effort to incorporate all of the synamic feedback provided, but the anonymous nature it difficult to "close the loop" with the student who provided the feedback and assure them that their feedback had been acted upon. There is a fundamental trade-off between anonymous surveys that encourage complete response candor and attributed surveys that give the instructor the most information and flexibility to address any issues that are raised.

Another factor appears to have been the lag in videotape delivery. In the case of international students, tape delivery lags were typically in excess of two weeks. There would be additional delays before the student actually viewed the tape, before the student completed the online survey, and before the next class broadcast. It is difficult to have the entire class "backtrack" after such a significant delay to clarify a point that may be confusing a single student. Once again, the anonymous nature of the survey precludes the instructor from pursuing one-on-one remediation. More research seems justified to characterize this trade-off between anonymous and attributed feedback.

Visualization

This technique was not explored in the initial online survey. In the mailed survey, students were asked to indicate whether clip art, word pictures and animation "Improved Understanding", had "No Impact on Understanding", or were "Distracting". Seven out of 8 responses indicated that the visualization aids "Improved Understanding" while the remaining respondent indicated that this technique had "No Impact on Understanding". The only relevant open-ended response indicated that the student liked the use of visualization techniques, but the thoughtful respondent was concerned about the amount of effort that visualization imposed on the instructor!

For the FCQ, the average rating for visualization was 3.5 out of 4. Two out of 17 responses were "Neutral" toward the technique with the remainder characterizing it as either "Good" or "Very Good". No open-ended responses were offered on the FCQ with respect to visualization techniques.

Strong, consistent support for visualization techniques is clearly indicated.

Interactive Lecture Outlines

For the initial survey, students were asked whether the requirement to fill in blanks on the handouts would "Aid Focus" or "Distract". Five responses indicated that the blanks would "Aid Focus" while one suggested that they would "Distract". There were no open-ended remarks regarding the blanks from the initial survey.

In the mailed survey, response alternatives ranged from "Increase Attention" to "No Impact on Attention" to "Distract". There were three responses in each category. There were no open-ended remarks about the handout blanks among the mailed survey responses.

With the FCQ, the average rating of blanks on the handouts for sixteen respondents was 3.0 out of 4. One respondent each characterized the blanks as "Poor" and "Very Poor" with the remainder rating them either "Good" or "Very Good". One student mentioned handout blanks as among the least effective aspects of the course in the open-ended FCQ remarks. Another indicated that the use of blanks was not befitting a graduate course. Under the "most effect aspects" heading, one student indicated all of the techniques mentioned in the preceding sections except for the handout blanks.

Average survey responses indicate that handout blanks are preferred by the students. However, the variations between survey results and within each survey are a source of concern. The option of either complete or "interactive" handouts is being considered for future course offerings.

Conclusions

Three of the five techniques investigated (web site, threaded discussion forum, and visualization) appear to be strongly preferred for students similar to those enrolled in our program. Dynamic feedback also appears to be an effective technique, but further research regarding anonymous versus attributed surveys may lead to further improvement. Blanks included with handouts should be applied cautiously; the survey results cited here indicate a great deal of variation in the acceptance of this technique. Further investigation of the factors that influence student acceptance of this technique is also recommended.

Finally, the importance of adequate support for this sort of activity cannot be overstated. The conclusions from this investigation could be much stronger if an unplanned web server upgrade (unplanned, at least, from the instructor's perspective) had not occurred mid-semester and if the commitment to a timely repair of HyperNews had been greater. Timely support to make the dynamic feedback CGI compatible with all of the students' browsers would have increased the sample size and enhanced the validity of the results reported.

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